Conserving woodland birds

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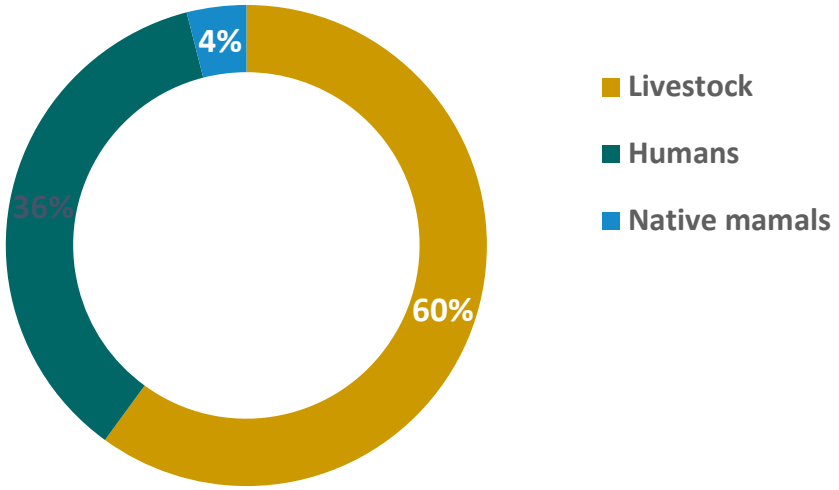
SUSTAINABLE FARMS

World’s biggest driver of extinction = agriculture



Huge challenge to integrate agricultural production & biodiversity

Impact on the land

- 2.9 billon ha arable land is degraded (bigger than Russia)
- Impacts > 3.2 billion people
- $14 trillion to fix – 2/3rd US GDP
- Oceania – 360m ha degraded (arable) land
- > 6 billion trees removed from MDB

IPBES, 2018, Gibbs and Salmon, 2015, Crouzeilles et al., 2019; Walker et al. 1993

Temperate woodlands among the world's most extensively altered ecosystems

Many woodland bird species in serious decline

- 95-99% of many woodland types cleared
- Some forecasts have 50% of woodland birds lost by 2050
- Woodland bird assemblages often dominated by large birds (Noisy Miner effect)

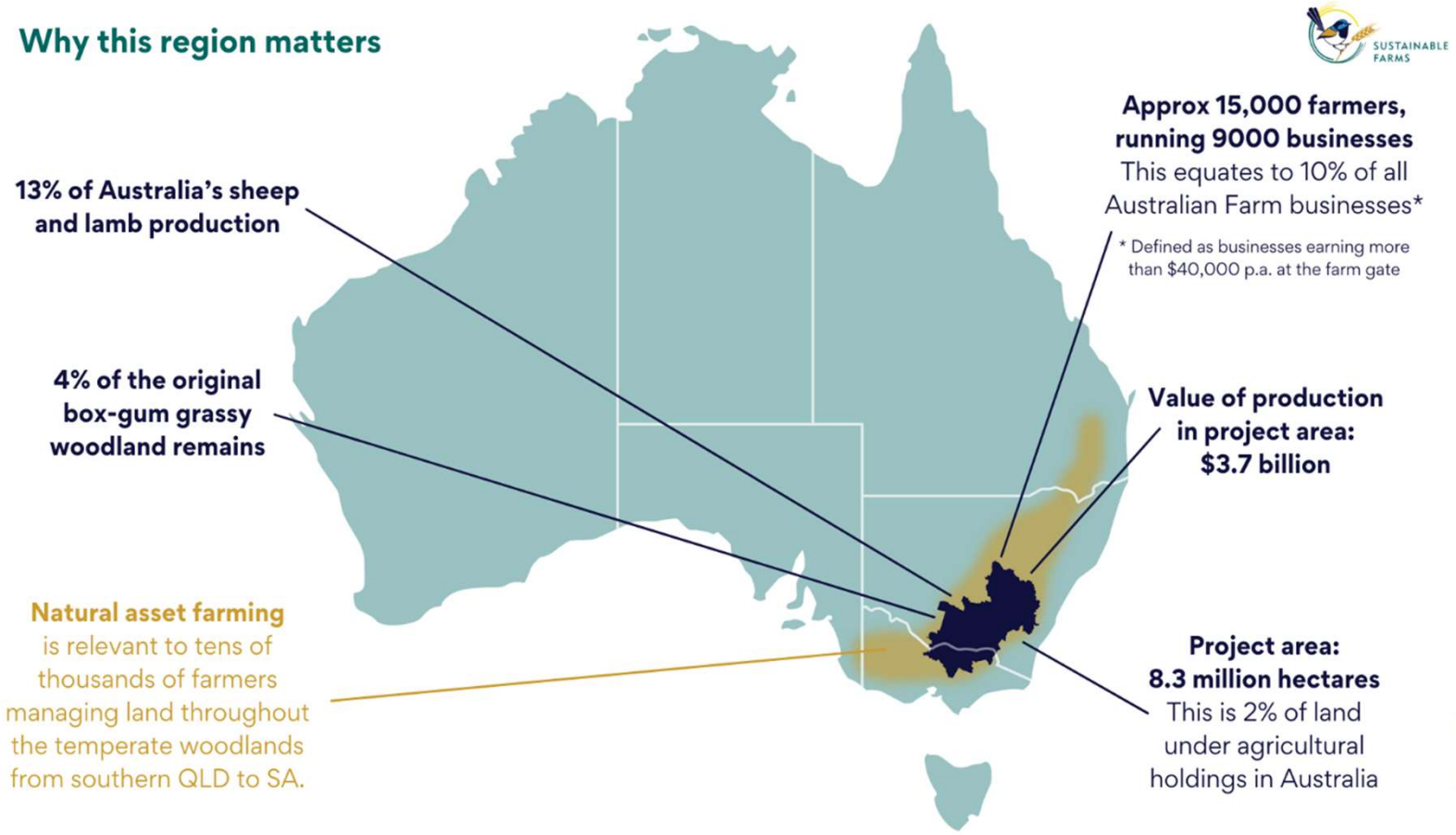
SUSTAINABLE
FARMS

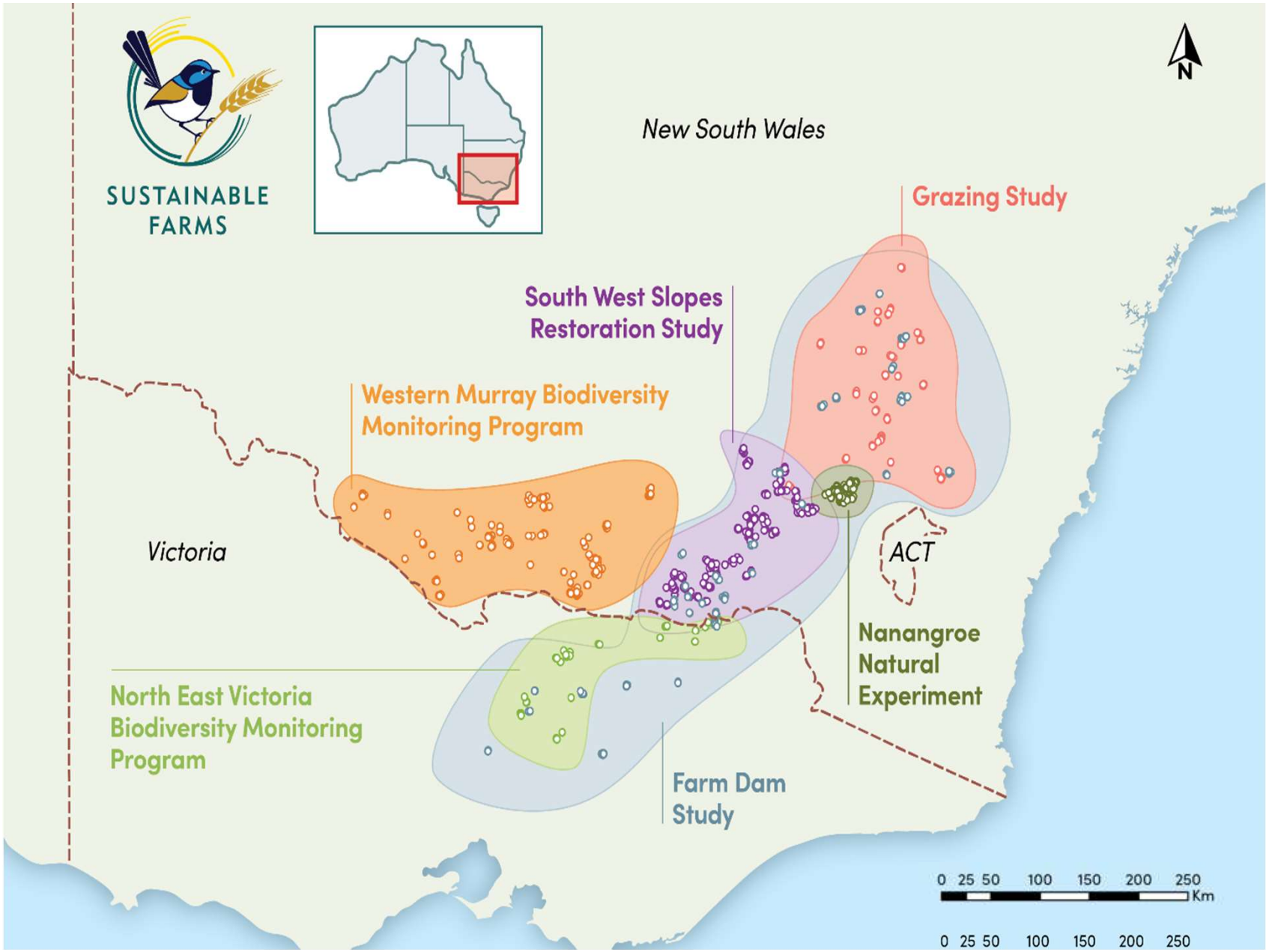
www.sustainablefarms.org.au

Sustainable Farms

@SusFarms_ANU

Sustainable Farms Project Area




SUSTAINABLE FARMS
New South Wales
Grazing Study
South West Slopes Restoration Study
Western Murray Biodiversity Monitoring Program
Victoria
ACT
Nanangroe Natural Experiment
North East Victoria Biodiversity Monitoring Program
Farm Dam Study
N
0 25 50 100 150 200 250
Km
0 25 50 100 150 200 250

23 years – 838 sites, varying in condition & management


Tree planting


Mixed farming landscape


Protecting remnant trees


Enhancing remnants with plantings


Protecting waterways


Remnant paddock trees

Sustainable Farms Projects to Improve Natural Assets on Farms

Biodiversity data

Vegetation:
- Plant species richness
- Vegetation structure
- Tree inventory

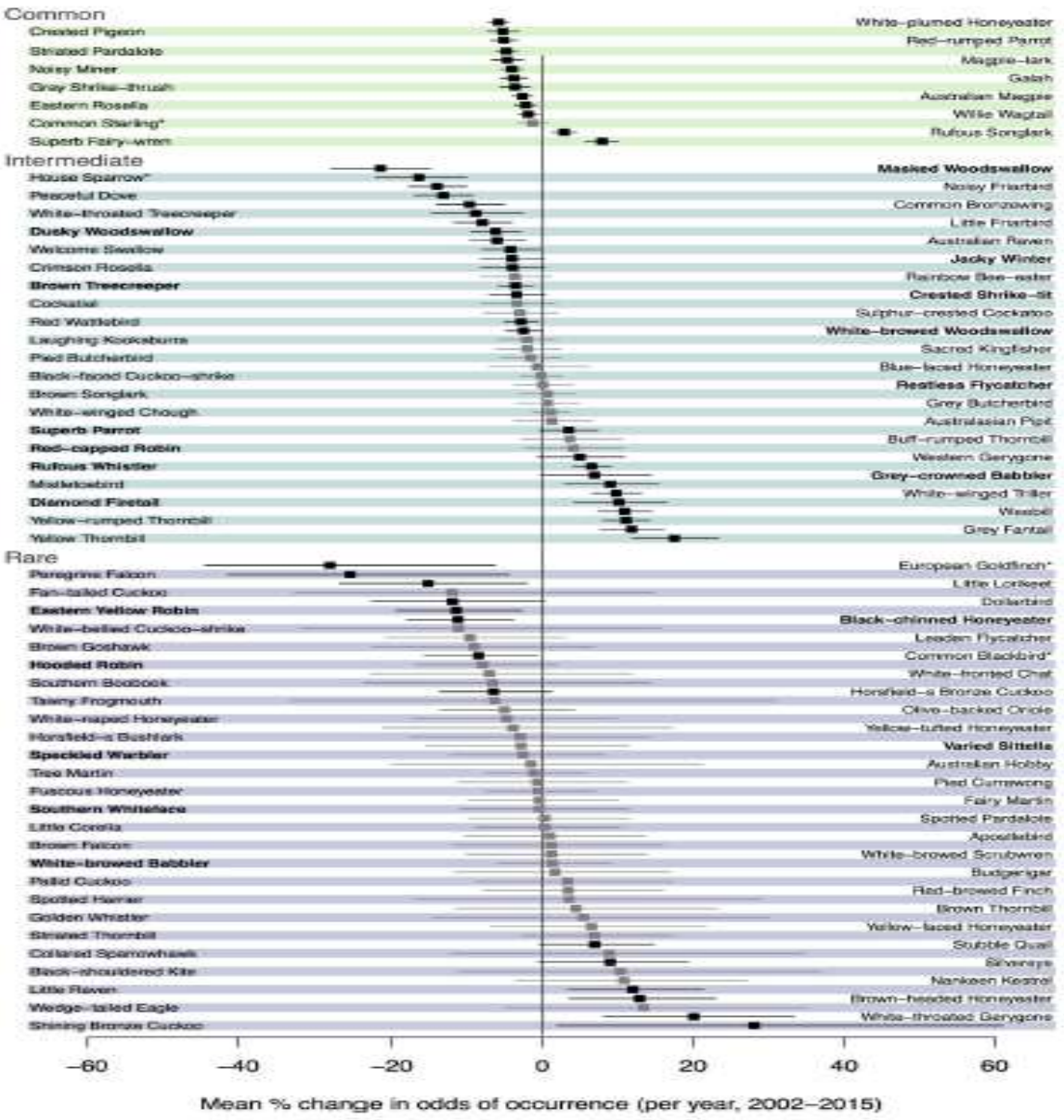
Animals:
- **Birds**
- Reptiles
- Mammals

Habitat attributes:
- Hollow trees
- Bare ground
- Rocky outcrops
- CWD
- Litter layer
- Area of woody vegetation

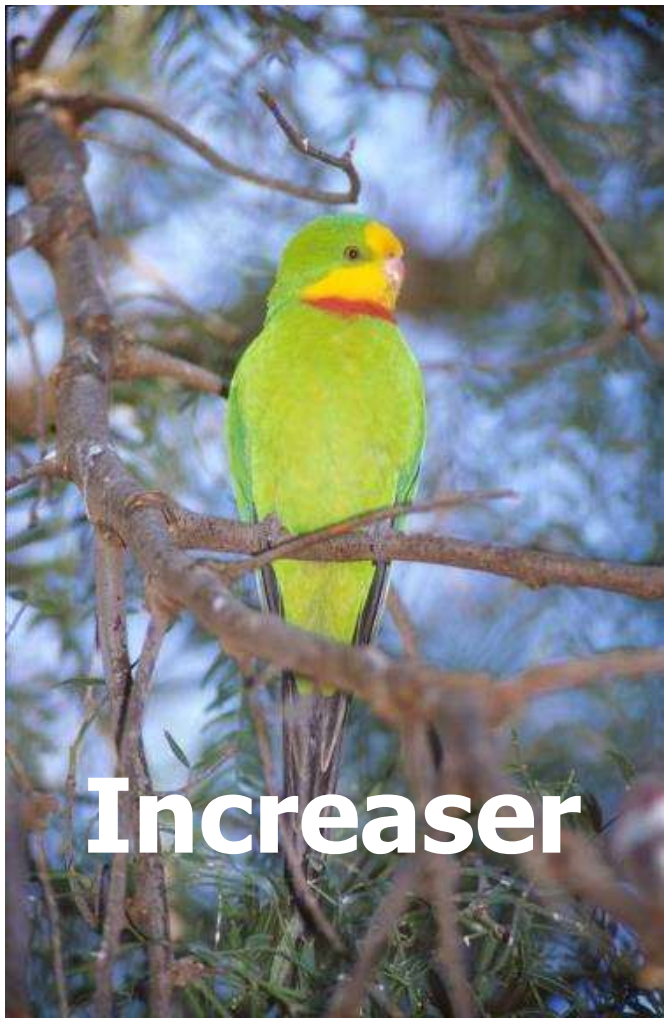
TEMPORAL TRENDS IN WOODLAND BIRDS

General trends

- South West Slopes 2002-2021
- 203 sites
- 30 of 108 species declined – Dusky & masked Woodswallow, Eastern Yellow Robin, Black-chinned Honeyeater, Hooded Robin
- 14 of 108 species increased
- Small-bodied birds increased – especially in plantings
- Common birds declined
- Many rarer species increased – including Diamond Firetail


Common
Crested Pigeon
Striated Pardalote
Noisy Miner
Grey Shrike–thrush
Eastern Rosella
Common Starling*
Superb Fairy–wren
Intermediate
House Sparrow*
Peaceful Dove
White–throated Treecreeper
Dusky Woodswallow
Welcome Swallow
Crimson Rosella
Brown Treecreeper
Cockatiel
Red Wattlebird
Laughing Kookaburra
Pied Butcherbird
Black–faced Cuckoo–shrike
Brown Songlark
White–winged Chough
Superb Parrot
Red–capped Robin
Rufous Whistler
Mistletoebird
Diamond Firetail
Yellow–rumped Thornbill
Yellow Thornbill
Rare
Peregrine Falcon
Fan–tailed Cuckoo
Eastern Yellow Robin
White–bellied Cuckoo–shrike
Brown Goshawk
Hooded Robin
Southern Boobook
Tawny Frogmouth
White–naped Honeyeater
Horsfield's Bushlark
Speckled Warbler
Tree Martin
Fuscous Honeyeater
Southern Whiteface
Little Corella
Brown Falcon
White–browed Babbler
Pallid Cuckoo
Spotted Harrier
Golden Whistler
Striated Thornbill
Collared Sparrowhawk
Black–shouldered Kite
Little Raven
Wedge–tailed Eagle
Shining Bronze Cuckoo
White–plumed Honeyeater
Red–rumped Parrot
Magpie–lark
Galah
Australian Magpie
Willie Wagtail
Rufous Songlark
Masked Woodswallow
Noisy Friarbird
Common Bronzewing
Little Friarbird
Australian Raven
Jacky Winter
Rainbow Bee–eater
Crested Shrike–tit
Sulphur–crested Cockatoo
White–browed Woodswallow
Sacred Kingfisher
Blue–faced Honeyeater
Restless Flycatcher
Grey Butcherbird
Australasian Pipit
Buff–rumped Thornbill
Western Gerygone
Grey–crowned Babbler
White–winged Triller
Weebill
Grey Fantail
European Goldfinch*
Little Lorikeet
Dollarbird
Black–chinned Honeyeater
Leaden Flycatcher
Common Blackbird*
White–fronted Chat
Horsfield–s Bronze Cuckoo
Olive–backed Oriole
Yellow–tufted Honeyeater
Varied Sittella
Australian Hobby
Pied Currawong
Fairy Martin
Spotted Pardalote
Apostlebird
White–browed Scrubwren
Budgerigar
Red–browed Finch
Brown Thornbill
Yellow–faced Honeyeater
Stubble Quail
Silvereye
Nankeen Kestrel
Brown–headed Honeyeater
White–throated Gerygone
−60
−40
−20
0
20
40
60
Mean % change in odds of occurrence (per year, 2002–2015)

Some winners…..


Increaser


Decreaser

Biological Conservation 222 (2018) 212–221

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

Tests of predictions associated with temporal changes in Australian bird populations

David B. Lindenmayer[a,b,c,*], Peter Lane[a], Martin Westgate[a], Ben C. Scheele[a,b], Claire Foster[a], Chloe Sato[a], Karen Ikin[a], Mason Crane[a,c], Damian Michael[a,b], Dan Florance[a,c], Philip Barton[a], Luke S. O'Loughlin[a], Natasha Robinson[a,b]

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ARTICLE INFO

Keywords:
Woodland birds
South-eastern Australia
Time-series data

ABSTRACT

Global biodiversity loss is the cumulative result of local species declines. To combat biodiversity loss, detailed information on the temporal trends of at-risk species at local scales is needed. Here we report the results of a 13-year study of temporal change in bird occupancy in one of the most heavily modified biomes worldwide; the


DIFFERENT GROWTH TYPES ARE DIFFERENT HABITATS FOR DIFFERENT SPECIES OF BIRDS

Growth types

Growth forms are different habitats

Clear difference ($P < 0.05$) in the bird assemblage between vegetation growth forms.

Distribution of birds

- 25/90 species in seedling regrowth
- 20/90 species in coppice regrowth
- 15/90 in old growth

Lindenmayer, Northrop-Mackie, Montague-Drake, Crane, Michael, Okada & Gibbons (2012) PLoS One, 7(4).

Seedling Regrowth Species

Black-chinned Honeyeater (13%)

Brown Treecreeper (43%)

Crested Shrike-Tit (25%)

Buff-rumped Thornbill (9.5%)

Eastern Yellow Robin (6.5%)

Grey-crowned Babbler (9%)

Old Growth Species

Cockatiel (16%)
Common Starling (70.5%)
Eastern Rosella (88%)
Galah (93.5%)
Laughing Kookaburra (52%)
Little Corella (10.5%)
Noisy Miner (79%)
Striated Pardalote (77%)
Sulphur-crested Cockatoo (42%)

- Lindenmayer, Northrop-Mackie, Montague-Drake, Crane, Michael, Okada & Gibbons (2012) PLoS One, 7(4).

Non-inter-changeability

Planting is important but not at the expense of old growth or regrowth woodland

Offsets implications

Need to have portfolio of different vegetation assets

Lindenmayer et al., (2012). PLOS One

OPEN ACCESS Freely available online

PLoS one

Not All Kinds of Revegetation Are Created Equal: Revegetation Type Influences Bird Assemblages in Threatened Australian Woodland Ecosystems

David B. Lindenmayer*, Amanda R. Northrop-Mackie, Rebecca Montague-Drake, Mason Crane, Damian Michael, Sachiko Okada, Philip Gibbons

Fenner School of Environment and Society, ARC Centre of Excellence for Environmental Decisions, and National Environment Research Program, The Australian National University, Canberra, Australia

Abstract

The value for biodiversity of large intact areas of native vegetation is well established. The biodiversity value of regrowth vegetation is also increasingly recognised worldwide. However, there can be different kinds of revegetation that have different origins. Are there differences in the richness and composition of biotic communities in different kinds of revegetation? The answer remains unknown or poorly known in many ecosystems. We examined the conservation value of different kinds of revegetation through a comparative study of birds in 193 sites surveyed over ten years in four growth types located in semi-cleared agricultural areas of south-eastern Australia. These growth types were resprout regrowth, seedling regrowth, plantings, and old growth. Our investigation produced several key findings: (1) Marked differences in the bird assemblages of plantings, resprout regrowth, seedling regrowth, and old growth. (2) Differences in the number of species detected significantly more often in the different growth types; 29 species for plantings, 25 for seedling regrowth,


What makes a good planting?

What makes a good planting?

- **Location (gullies)** - 3.2 bird species increase cf midslopes & ridges
- **Size** – increased richness but not as important as context
- **Shape** (block/strip) - important for some species
- **Contains** logs, large old trees, dams, understorey, mistletoe
- Fenced and **not** grazed

Biological Conservation 143 (2010) 289–301

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journal homepage: www.elsevier.com/locate/biocon

What makes an effective restoration planting for woodland birds?

D.B. Lindenmayer [a,*], E.J. Knight [a,b], M.J. Crane [a], R. Montague-Drake [a], D.R. Michael [a], C.I. MacGregor [a]

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Keywords:
Agricultural landscapes
Birds

ABSTRACT

Large-scale vegetation clearing accompanying agricultural development has been a major driver of biodiversity loss. Efforts to reverse this problem have often included revegetation, but the value of revegetated areas for biodiversity is poorly known. We addressed aspects of this knowledge gap using a case study in south-eastern Australia. We quantified relationships between bird species richness and the probability of detection for eight individual bird species and: (i) the context of a planting, i.e. the types of the vegetation cover in the neighborhood of a planting, (ii) the configuration of a planting, i.e. the location and geometry of a planting, and, (iii) the content of planting, i.e. the vegetation features of a planting.

The presence and nature of the effects of these explanatory variables varied with each of our response

HOW DO PLANTINGS CHANGE OVER TIME?

How do birds in plantings change over time?

Species richness does not change over time in spring

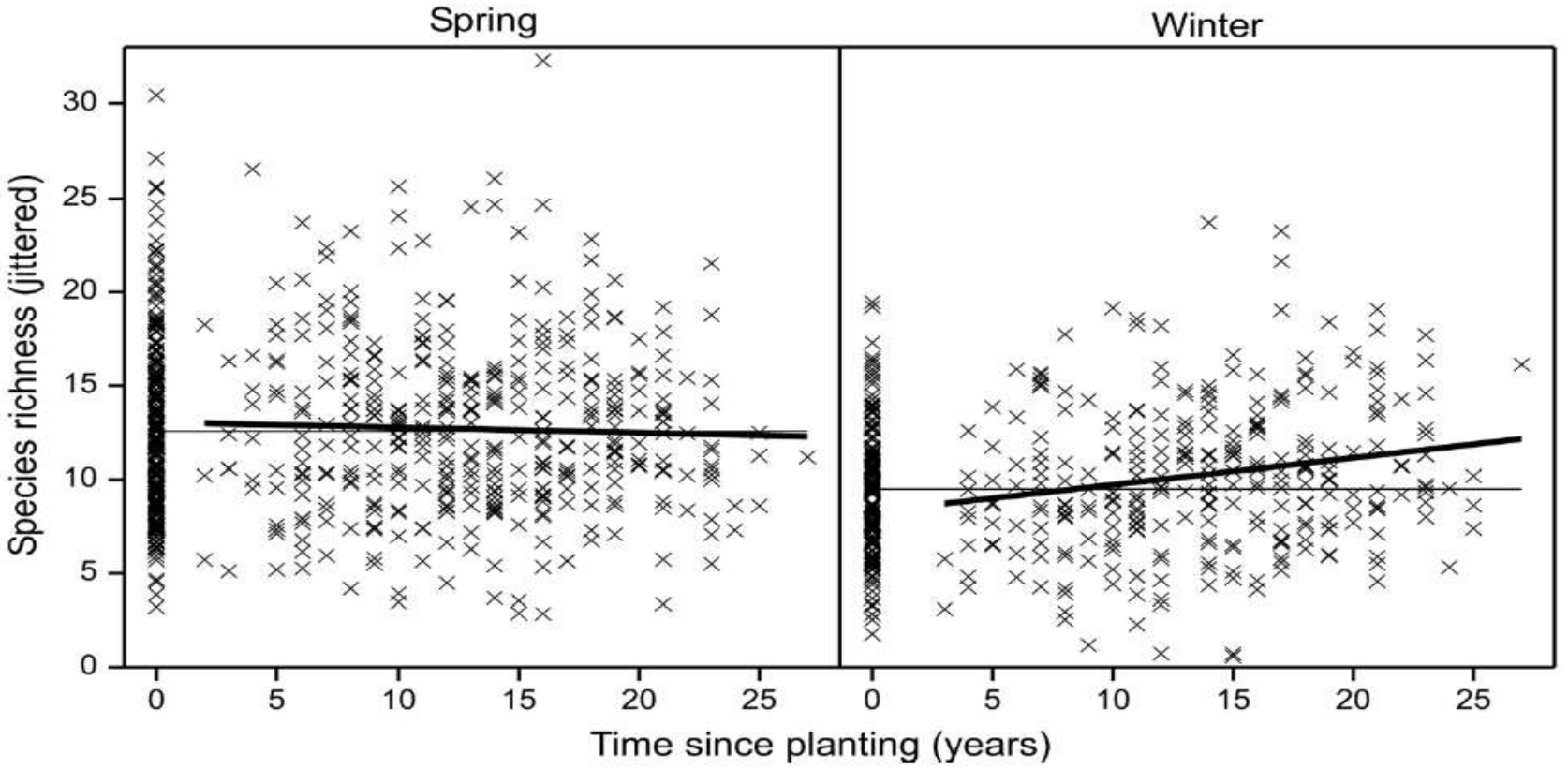
Species richness increases with time in winter (extra species on average every 7 years)

BUT composition of the bird assemblage changes massively over time

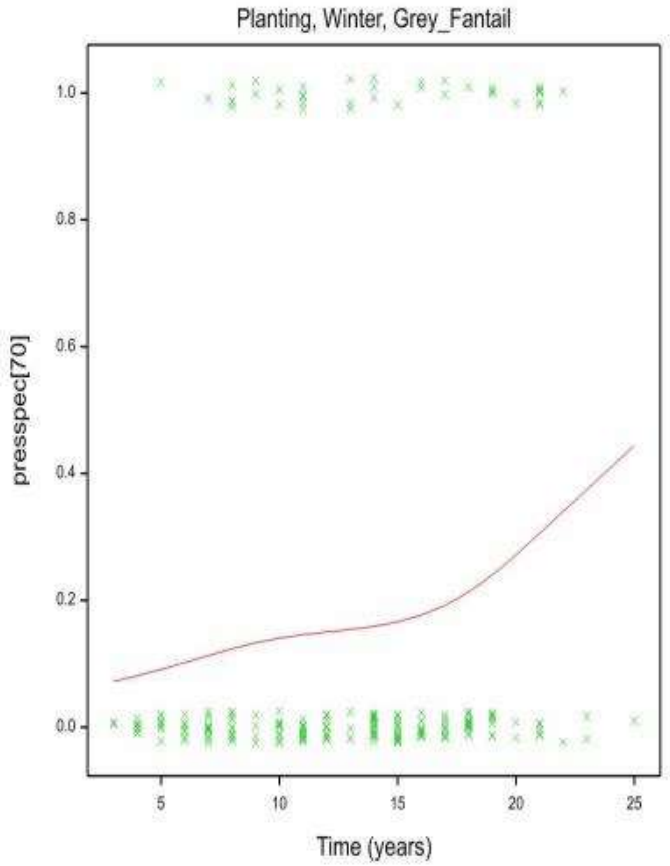
Key results

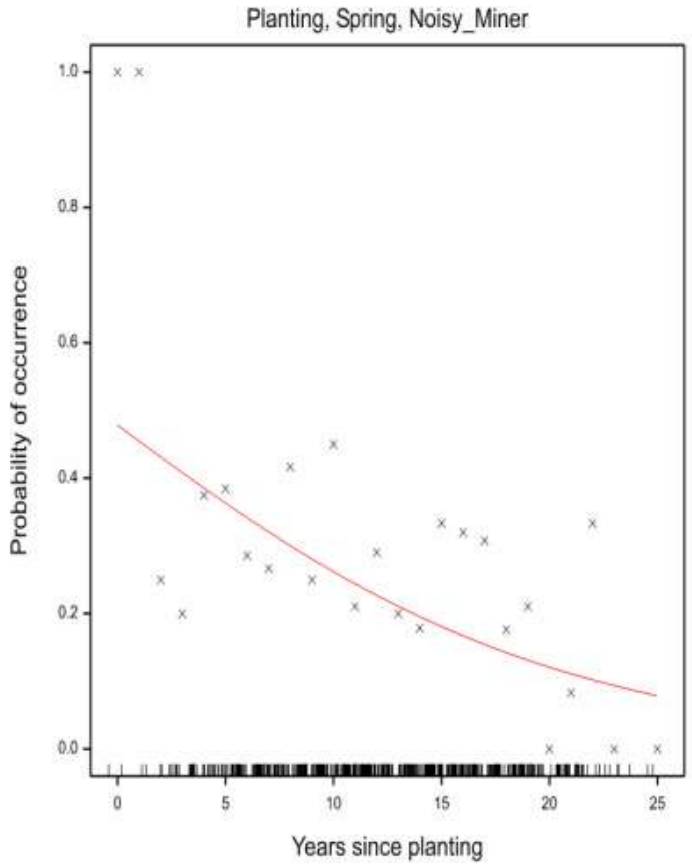
- Species colonise
- Species drop out
- Species replaced
- Older plantings = migratory species
- Links with bird size and vegetation (which also changes thru time)
- Wider plantings do better – but narrow ones catch up after 15+ years

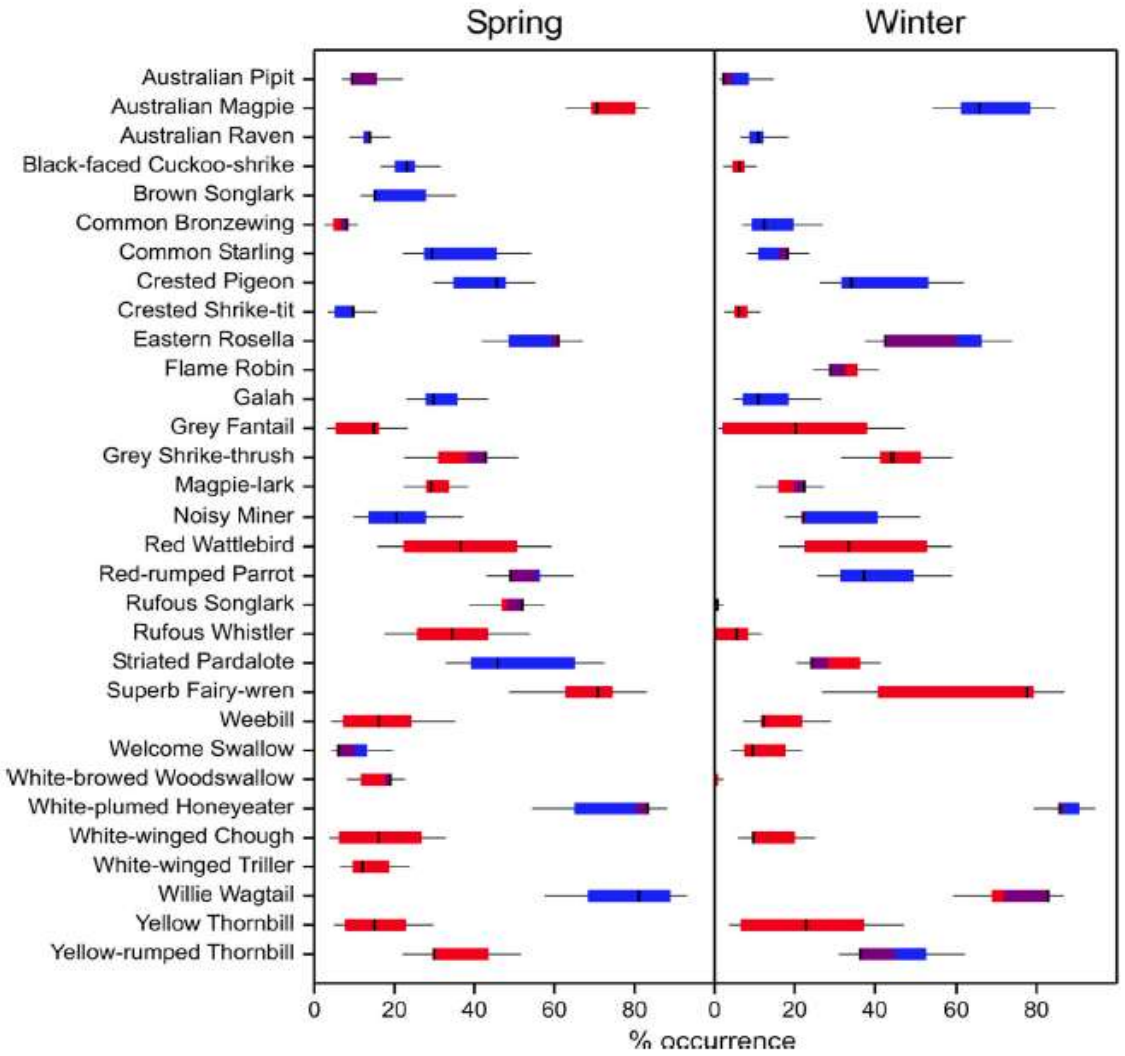
Changes in plantings over time



Individual species responses







Length of bars = size of change
Red = increase with planting age
Blue = decrease with planting age

Biodivers Conserv (2016) 25:1587–1603
DOI 10.1007/s10531-016-1140-8

ORIGINAL PAPER

Long-term bird colonization and turnover in restored woodlands

David B. Lindenmayer[1,2,3] · P. W. Lane[1] · P. S. Barton[1] · Mason Crane[1] · Karen Ikin[1,2,3] · Damian Michael[1,3] · Sachiko Okada[1]

Received: 10 November 2015 / Revised: 10 May 2016 / Accepted: 11 May 2016 /
Published online: 23 May 2016

Abstract The long-term effectiveness of restored areas for biodiversity is poorly known for the majority of restored ecosystems worldwide. We quantified temporal changes in bird occurrence in restoration plantings of different ages and geometries, and compared


Plantings, biodiversity
and grazing

Plantings, biodiversity and grazing

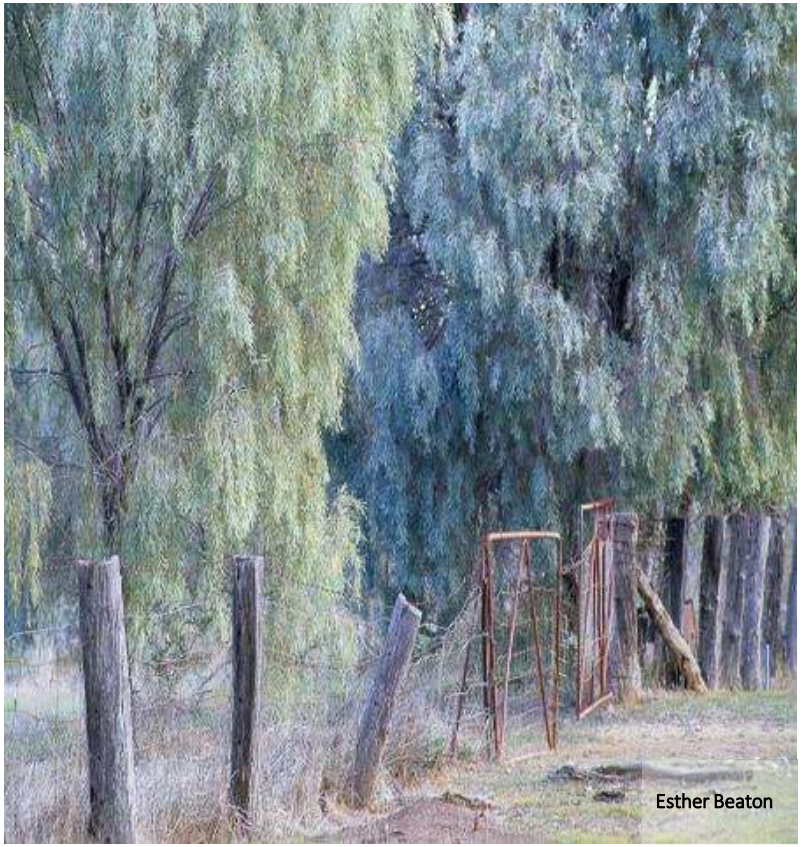
Grazed vs ungrazing plantings over time

As plantings age = loss of fences/or removed

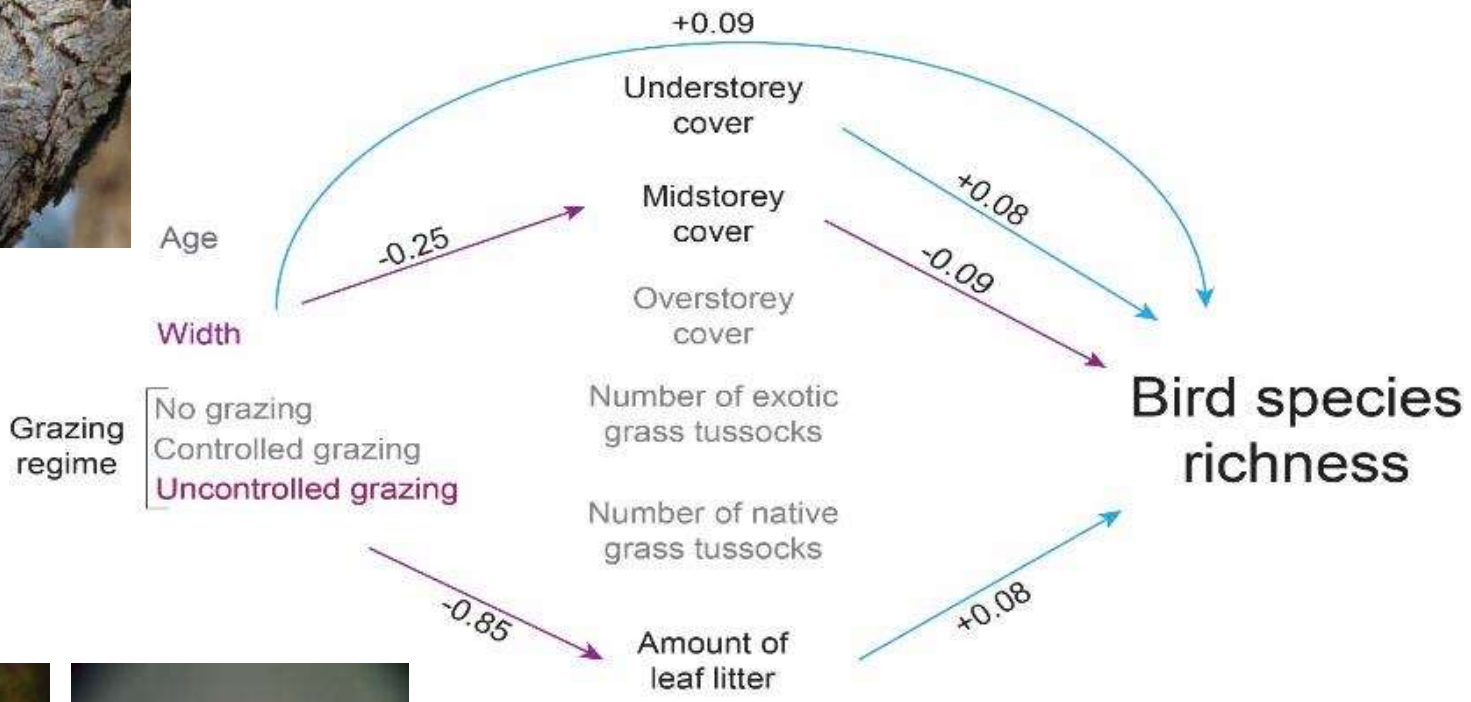
Grazing alters leaf litter & midstorey cover

Path analysis = negative impacts on birds

Avoid grazing plantings



Lindenmayer et al. (2018) (Restoration Ecol) doi: 10.1111/rec.12676


+0.09
Understorey cover
+0.08
Midstorey cover
-0.09
Overstorey cover
Age
-0.25
Width
Grazing regime
No grazing
Controlled grazing
Uncontrolled grazing
Number of exotic grass tussocks
Number of native grass tussocks
-0.85
Amount of leaf litter
+0.08
Bird species richness

Restoration Ecology
THE JOURNAL OF THE SOCIETY FOR ECOLOGICAL RESTORATION

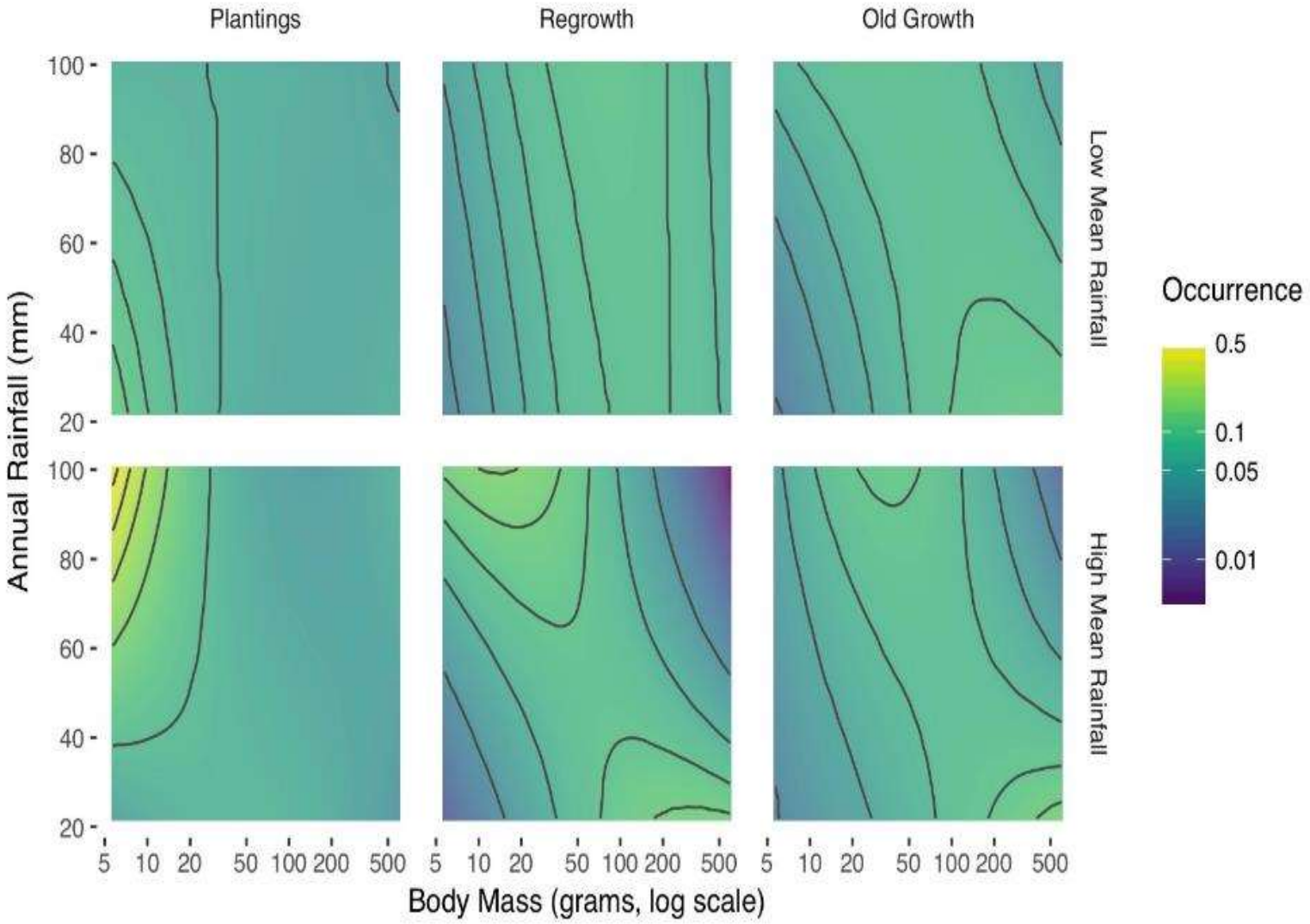
RESEARCH ARTICLE

Biodiversity benefits of vegetation restoration are undermined by livestock grazing

David B. Lindenmayer[1,2,3], Wade Blanchard[1], Mason Crane[1,2], Damian Michael[1,2], Chloe Sato[1]

Extensive areas of the Earth's terrestrial surface have been subject to restoration, but how best to manage such restored areas has received relatively limited attention. Here, we quantify the effects of livestock grazing on bird and reptile biota within 61 restoration plantings in south-eastern Australia. Using path analysis, we identified some of the mechanisms giving rise to differences in patterns of species richness and individual species occurrence between grazed and ungrazed plantings. Specifically, we found evidence of both: (1) indirect effects of grazing on various elements of biodiversity mediated through changes in vegetation condition (primarily the leaf litter layer), and (2) direct effects of grazing on biodiversity (irrespective of modification in vegetation cover attributes), possibly as a result of trampling by livestock. We also uncovered evidence of


Climate, weather, plantings
and resilience


Plantings
Regrowth
Old Growth
Low Mean Rainfall
High Mean Rainfall
Annual Rainfall (mm)
100
80
60
40
20
5
10
20
50
100
200
500
Body Mass (grams, log scale)
Occurrence
0.5
0.1
0.05
0.01

Plantings as critical refugia for birds

Small bird species (+ species of conservation concern) = plantings

Plantings = drought refuges; but +ve effects not seen in mesic periods

Received: 9 May 2018 | Revised: 17 October 2018 | Accepted: 31 October 2018
DOI: 10.1111/gcb.14524

PRIMARY RESEARCH ARTICLE

WILEY Global Change Biology

Weather effects on birds of different size are mediated by long-term climate and vegetation type in endangered temperate woodlands

David B. Lindenmayer[1,2,3] | Peter Lane[1] | Mason Crane[1,3] | Daniel Florance[1,3] | Claire N. Foster[1] | Karen Ikin[1] | Damian Michael[1] | Chloe F. Sato[1] | Ben C. Scheele[1,2] | Martin J. Westgate[1]

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Funding information
National Environmental Science Program, Threatened Species Recovery Hub, Grant/Award Number: Threatened Species Recovery Hub; The Australian Research Council; The Ian Potter Foundation; The Vincent Fairfax Family Foundation; Murray Local Land Services; Riverina Local Land Services; John Mitchell

Abstract

Species occurrence is influenced by a range of factors including habitat attributes, climate, weather, and human landscape modification. These drivers are likely to interact, but their effects are frequently quantified independently. Here, we report the results of a 13-year study of temperate woodland birds in south-eastern Australia to quantify how different-sized birds respond to the interacting effects of: (a) short-term weather (rainfall and temperature in the 12 months preceding our surveys), (b) long-term climate (average rainfall and maximum and minimum temperatures over the period 1970–2014), and (c) broad structural forms of vegetation (old-growth woodland, regrowth woodland, and restoration plantings). We uncovered significant interactions between bird body size, vegetation type, climate, and weather. High short-term rainfall was associated with decreased occurrence of large birds in old-growth and regrowth woodland, but not in restoration plantings. Conversely, small bird occurrence peaked in wet years, but this effect was most pronounced in locations with a history of high rainfall, and was actually reversed (peak occurrence in dry years) in restoration plantings in dry climates. The occurrence of small birds was depressed—and large birds elevated—in hot years, except in restoration plantings which supported few large birds under these circumstances. Our investigation suggests that different mechanisms may underpin contrasting responses of small and large birds to the interacting effects of climate, weather, and vegetation type. A diversity of vegetation cover is needed across a landscape to promote the occurrence of different-sized bird species in agriculture-dominated landscapes, particularly under variable weather conditions. Climate change is predicted to lead to widespread drying of our study region, and restoration plantings—especially currently climatically wet areas—may become critically important for conserving bird species, particularly small-bodied taxa.

KEYWORDS
birds, climate change, rainfall and temperature effects on biodiversity, revegetation, south-eastern Australia, weather

Tackling despots – using trees not guns

SUSTAINABLE FARMS

Plantings & key threatening processes

Noisy Miner

Hyper-aggressive native species

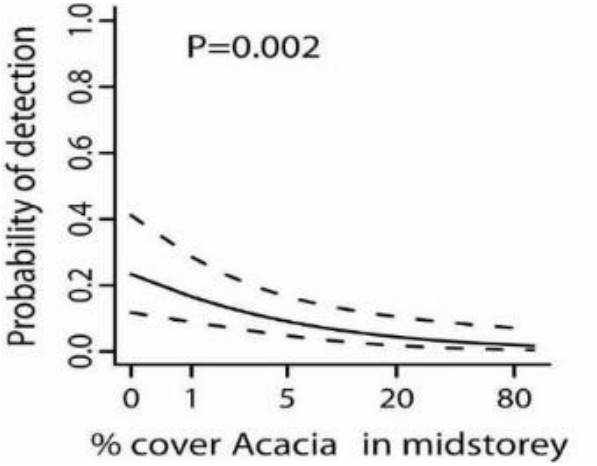
Listed as a KTP in woodlands

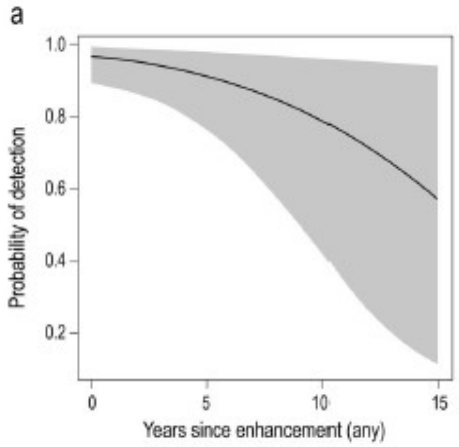
Long-term data - replantings with understorey = few miners

Understorey interventions = drives down Miners over time – takes > 8 years

Lindenmayer et al. 2010 (Biol Cons); Lindenmayer et al. 2018 (Rest. Ecol)

Woodland enhancement = less Miners





Lindenmayer et al. 2010, Biol. Cons,

Lindenmayer et al. 2018 Austral Ecol.

The Noisy Miner does not act alone

- Species co-occurrence patterns
- Grey & Pied Butcherbirds=few effects in isolation
- Strong synergistic effects when with NM
- Combined effects strongest on small birds
- Effects reduced when high midstorey cover

Received: 5 April 2020 | Accepted: 4 September 2020

DOI: 10.1111/1365-2664.13838

RESEARCH ARTICLE

Journal of Applied Ecology | BRITISH ECOLOGICAL SOCIETY

Synergistic impacts of aggressive species on small birds in a fragmented landscape

Martin J. Westgate[1,2,3] | Mason Crane[1,2,3] | Daniel Florance[1,2,3] | David B. Lindenmayer[1,2,3]

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Funding information
Australian Government National Environmental Science Program; Australian Research Council; Murray and Riverina Local Land Services

Handling Editor: Cristina Banks-Leite

Abstract

1. Attempts to conserve threatened species in fragmented landscapes are often challenging because factors such as habitat loss, habitat degradation and dominant species interact to reduce threatened species' capacity to survive and reproduce. Understanding how threatening and mitigating processes interact is critical if conservation measures are to be effective.
2. We used data from long-term monitoring of bird populations and multivariate latent variable models to quantify how Australian woodland birds respond to the presence of the Noisy Miner, a despotic species known to exclude other bird species. We then investigated the extent to which the presence of other aggressive species exacerbates the impacts of the Noisy Miner, and to what extent these impacts can be mitigated by dense midstorey plantings.
3. We found strong synergies between the Noisy Miner and two other aggressive species (Grey Butcherbird and Pied Butcherbird), despite weak effects of butcherbirds in isolation.

Bird breeding success

Bird breeding success

- Ph.D led by Donna Belder
- Related work after NM "removal" in Ph.D by Richard Beggs
- Most studies are occurrence-based, not demography-based
- Plantings are **not** ecological traps or population sinks
- Small plantings and remnants are valuable breeding habitat
- Some species forage across multiple separate plantings (Wrens & Wagtails)

Biological Conservation 236 (2019) 134–152

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journal homepage: www.elsevier.com/locate/biocon

Is bigger always better? Influence of patch attributes on breeding activity of birds in box-gum grassy woodland restoration plantings

Donna J. Belder[a,b,*], Jennifer C. Pierson[a,c], Karen Ikin[a], Wade Blanchard[a], Martin J. Westgate[a], Mason Crane[a,d], David B. Lindenmayer[a,b,d]

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ARTICLE INFO

Keywords:
Woodland birds
Breeding success
SLOSS
Restoration
Fragmentation
Agricultural landscapes

ABSTRACT

Restoration plantings are an increasingly common management technique to address habitat loss in agricultural landscapes. Native fauna, including birds, may occupy planted areas of vegetation. However, unless restoration plantings support breeding populations, their effectiveness as a conservation strategy may be limited. We assessed breeding activity of birds in box-gum grassy woodland restoration plantings in the South-west Slopes bioregion of New South Wales, Australia. We compared breeding activity in plantings of different size (1.3–7.7 ha) and shape (linear and block-shaped) to breeding activity in a set of remnant woodland sites. Contrary to expectations, we found that bird breeding activity was greatest per hectare in small patches. This trend was driven by the superb fairywren – the most abundant species in the woodland assemblage. We also found a negative effect of planting age, with younger plantings supporting more breeding activity per hectare. We found no effect of patch type or shape on breeding activity, and that species' relative abundance was not predictive of their degree of breeding activity. Our results highlight the value of small habitat patches in fragmented agricultural landscapes, and indicate that restoration plantings are as valuable as remnant woodland patches for supporting bird breeding activity. We demonstrate the importance of breeding studies for assessing the conservation value of restoration plantings and other habitat patches for avifauna.

Ongoing declines of woodland birds: Are restoration plantings making a difference?

Donna J. Belder [1,2,3,6], Jennifer C. Pierson [1,4], Ashwin C. Rudder [3], and David B. Lindenmayer [1,2,5]

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Abstract. Woodland birds are a species assemblage of conservation concern, and their persistence in fragmented agricultural landscapes is dependent on both the preservation of existing woodland remnants and the implementation of restoration plantings. However, little is known about the habitat-use and persistence of birds in fragmented agricultural landscapes. We present a detailed, population-oriented study of woodland birds in temperate eucalypt woodland restoration plantings and remnant woodland patches in the South-west Slopes bioregion of New South Wales, Australia. First, we undertook a 3-yr mark–recapture project to assess annual survival and site fidelity in restoration plantings and woodland remnants. We supplemented our recapture efforts with resightings of color-banded individuals. Second, we tracked individual birds of two species, Superb Fairywren (*Malurus cyaneus*) and Willie Wagtail (*Rhipidura leucophrys*), and documented snapshots of their home ranges and movement patterns during the breeding season. Annual survival in the woodland bird assemblage was lower than expected (51%). Home ranges of the Superb Fairywren were positively correlated with patch size, and were constrained by patch edges in linear sites. Superb Fairywrens and Willie Wagtails were more likely to travel longer distances between substrates while foraging in linear sites. Willie Wagtails engaged in significant gap-crossing (up to 400 m) between adjacent habitat patches. Our findings indicate that (1) patch isolation and certain patch configurations place resident birds at an energetic disadvantage, and (2) in our study area, woodland bird populations are continuing to decline. We recommend landscape-scale habitat restoration programs aim to address ongoing population declines. Studies such as ours conducted over longer time periods would provide a deeper understanding of habitat use and population processes of woodland birds in fragmented agricultural landscapes.

Key words: animal movement; mark–recapture; population dynamics; ringing; territory.

Nest box studies

Two main projects

- **Nest boxes in remnants & plantings – connected or not**
- **Nest boxes as an offset for the Hume Highway**

Restoration Ecology
THE JOURNAL OF THE SOCIETY FOR ECOLOGICAL RESTORATION

RESEARCH ARTICLE

Do nest boxes in restored woodlands promote the conservation of hollow-dependent fauna?

David Lindenmayer[1,2,3,4], Mason Crane[1], Wade Blanchard[1], Sachiko Okada[1], Rebecca Montague-Drake[1]

Vegetation restoration is considered as an important strategy for reversing biodiversity decline in agricultural areas. However, revegetated areas often lack key vegetation attributes like large old hollow-bearing trees. As these trees take a long time to develop, artificial cavities such as nest boxes are sometimes provided to address lag effects. We conducted a 3-year experiment using 150 nest boxes with 4 designs to quantify patterns of occupancy within 16 replanted areas and 14 patches of remnant old-growth eucalypt woodland. We quantified patterns of occupancy of nest boxes in physically connected versus isolated remnants and plantings, and multiple covariate effects on nest box occupancy at the nest box, tree, patch, and landscape levels. Our analyses revealed a lower probability of nest box occupancy within remnants (vs. plantings) for 2 of the 6 response variables examined: any species and the Feral Honeybee. Nest boxes in connected remnants and plantings were more likely to be occupied than those in isolated plantings and remnants by any mammal and the Common Brushtail Possum. Nest boxes in restored woodlands are used by some hollow-dependent fauna but principally already common species and not taxa of conservation concern. Nest boxes were also used by pest species. A key management consideration must be to create connected habitat to facilitate colonization of nest boxes by mammals. Approximately 15% of the cavity-dependent vertebrates within the study area used next boxes, possibly because the diverse requirements of the array of other species were not met by the range of nest boxes deployed.

Key words: agricultural landscapes, cavity-users, connectivity, hollow-dependent animals, large old trees, vegetation restoration


Nest boxes in plantings

Nest Box results in woodlands

- Adds Brushtail Possum & Ringtail Possum
- Mostly reinforces already common species
- Better in connected versus isolated patches
- Plantings have higher nest box use (fewer hollows as alternative)
- Almost no records of threatened woodland birds

Nest Box results in woodlands

Key issue = create tailored-designed boxes for particular species

Lots of pest issues - bees and starlings

Biological Conservation 210 (2017) 286–292

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

The anatomy of a failed offset

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Table 1
Percentage of nest boxes where evidence of use was recorded over four years of monitoring. Exotic species are marked with an asterisk*.

Common name	Scientific name	2010	2011		2012		2013
		Spring	Spring	Summer	Spring	Summer	Spring
Black rat*	*Rattus rattus*	4.2	13.6	4.3	7.8	10.8	5.1
Brown treecreeper	*Climacteris picumnus*	0.6	0	0	0	0	0
Brush-tailed phascogale	*Phascogale tapoatafa*	0.3	0	0.6	0.3	0.3	0.7
Common brushtail possum	*Trichosurus vulpecula*	11.5	11.4	11.4	13.1	10.5	11.1
Common ringtail possum	*Pseudocheirus peregrinus*	2.6	6.5	4.0	5.9	4.3	5.7
Common starling*	*Sturnus vulgaris*	0.6	2.5	1.9	0.7	1.6	1.4
Crimson rosella	*Platycercus elegans*	1.3	0.6	0.3	0	0	0.7
Eastern rosella	*Platycercus eximius*	0.3	0.3	0	0	0	0.3
Feral honeybee*	*Apis mellifera*	7.0	11.7	11.4	7.8	8.2	8.1
Goanna	*Varanus varius*	0.3	0	0	0.3	0	0
Gould's wattled bat	*Chalinolobus gouldii*	0.3	0.3	0.3	0	0.7	0
Grey shrike-thrush	*Colluricincla harmonica*	0	0.6	0.3	0	0	0
House mouse*	*Mus musculus*	0	1.5	0	0	0.9	0
Marbled gecko	*Christinus marmoratus*	0	0.6	0.3	0.3	0	0.3
Peron's tree frog	*Litoria peronii*	0	0	0.3	0.3	0.7	0
Squirrel glider	*Petaurus norfolcensis*	0.6	0.3	0	0.3	0.7	0.3
Sugar glider	*Petaurus breviceps*	0.9	0.3	0.6	0.9	0.3	0.3
Unknown animal	Unknown animal	0	0	0	0.3	0	0

A sad saga

- Poorly designed
- Lots of pests
- Common species
- Almost no threatened species
- Badly attached
- Many fallen down within a year or so…

Think about proper offsets

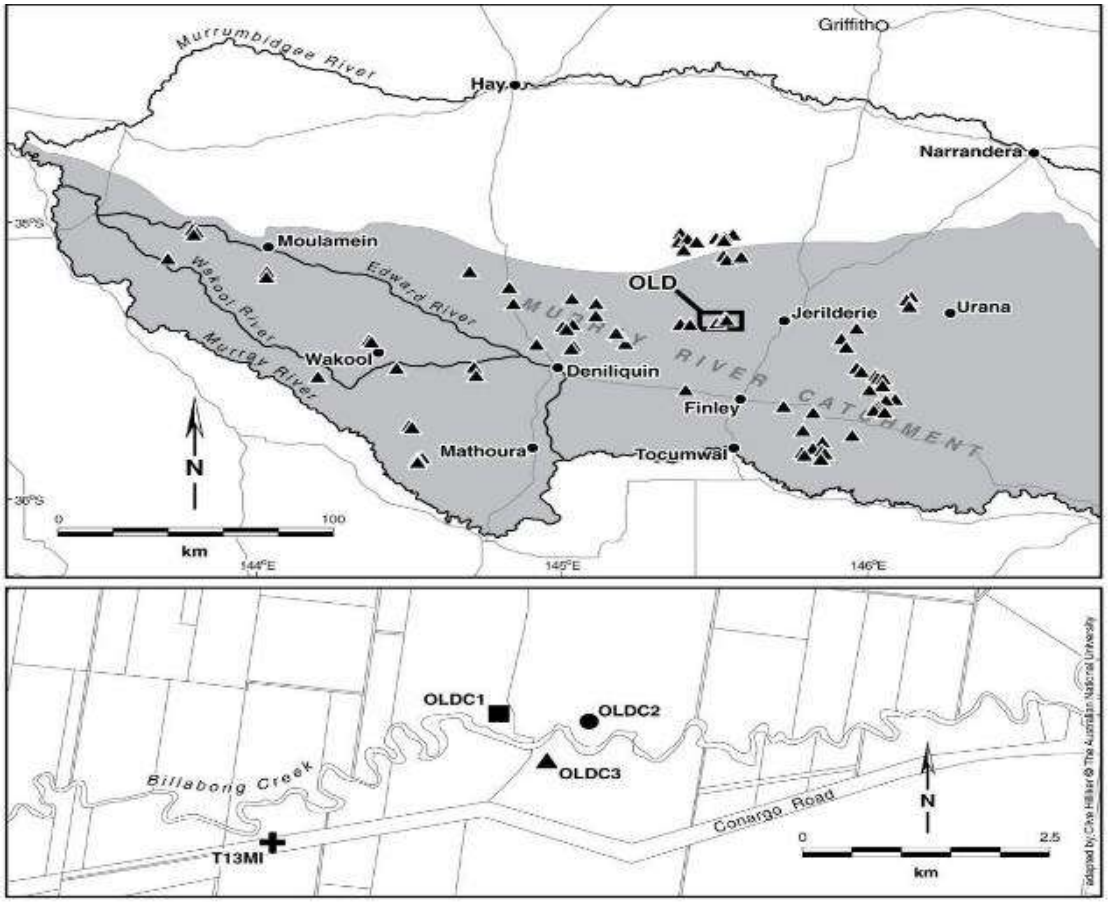
EFFECTIVENESS OF INTERVENTIONS

Did my intervention work?

- Western Murray
- Started in 2008 – 104 sites
- Long-term management interventions in incentive scheme
- Fencing/weed+grazing control/planting
- TSR vs long-term intervention vs short-term intervention vs business as usual
- Black Box/Grey Box/Boree/Sandhill woodland

SUSTAINABLE FARMS


Murray
CMA
CATCHMENT MANAGEMENT AUTHORITY
Actively Managed
Sandhill Vegetation
This land manager is working towards a healthier Murray Catchment
CONARGO SHIRE COUNCIL
New South Wales Government
Australian Government
FSF
F.S.FALKINER & SONS
December 2007



SUSTAINABLE FARMS

Past monitoring published in 2012

Biological Conservation 152 (2012) 62–73

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Is biodiversity management effective? Cross-sectional relationships between management, bird response and vegetation attributes in an Australian agri-environment scheme

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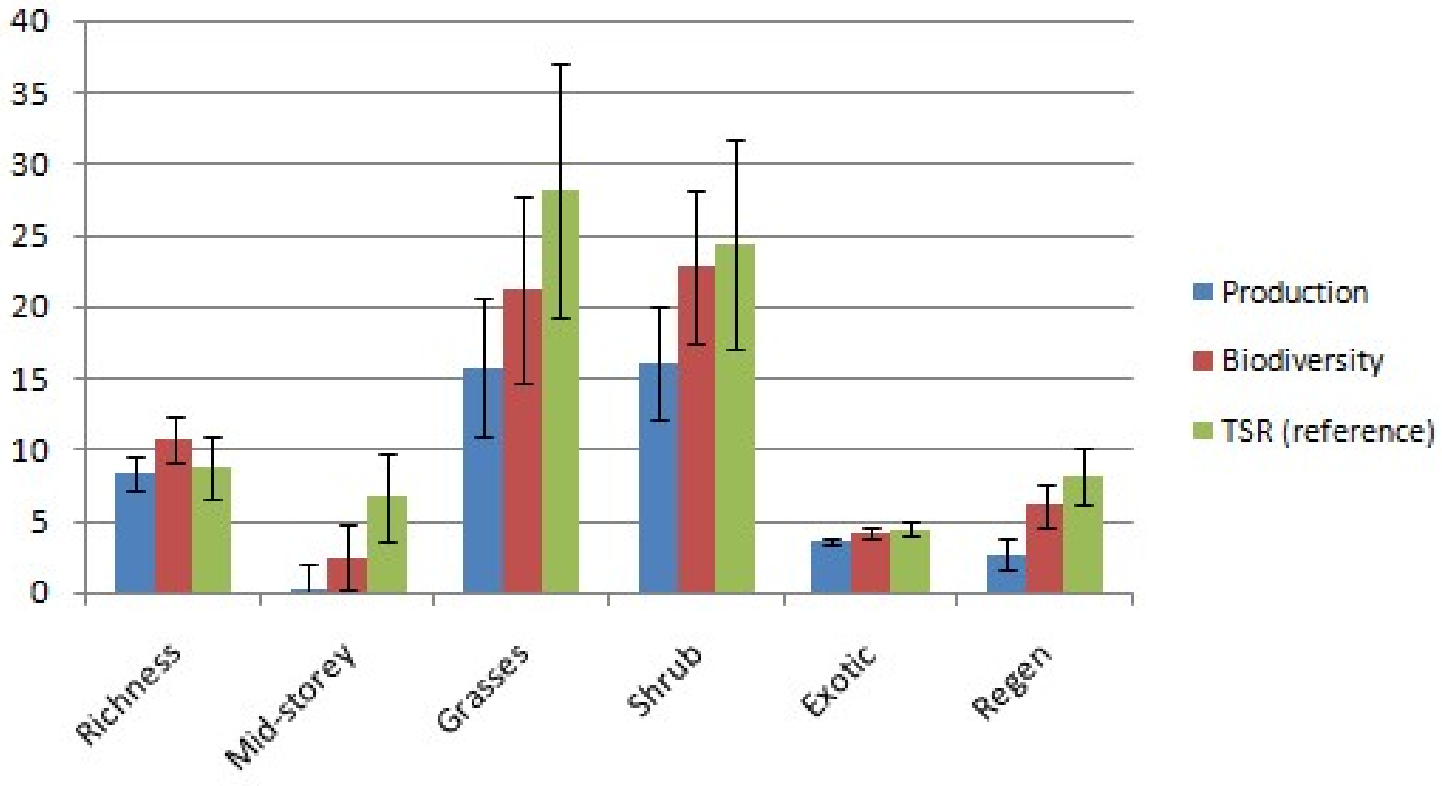
ABSTRACT

Do sites managed under an agri-environment scheme support significantly more biodiversity than sites managed in accordance with traditional agricultural practices? This is a key question underpinning agri-environment schemes worldwide, including one that we report on here that has been established in south-eastern Australia. To address this question, we established a large-scale, blocked and replicated


40
35
30
25
20
15
10
5
0
Richness
Mid-storey
Grasses
Shrub
Exotic
Regen
Production
Biodiversity
TSR (reference)

Vegetation drivers of bird response

Native shrub ground cover (positive)

Native plant species richness (positive)

Percentage overstorey regeneration (positive)

Percentage of bare ground (negative)

Key findings

Intervention changes vegetation

Vegetation affects birds

Small woodland birds benefit most

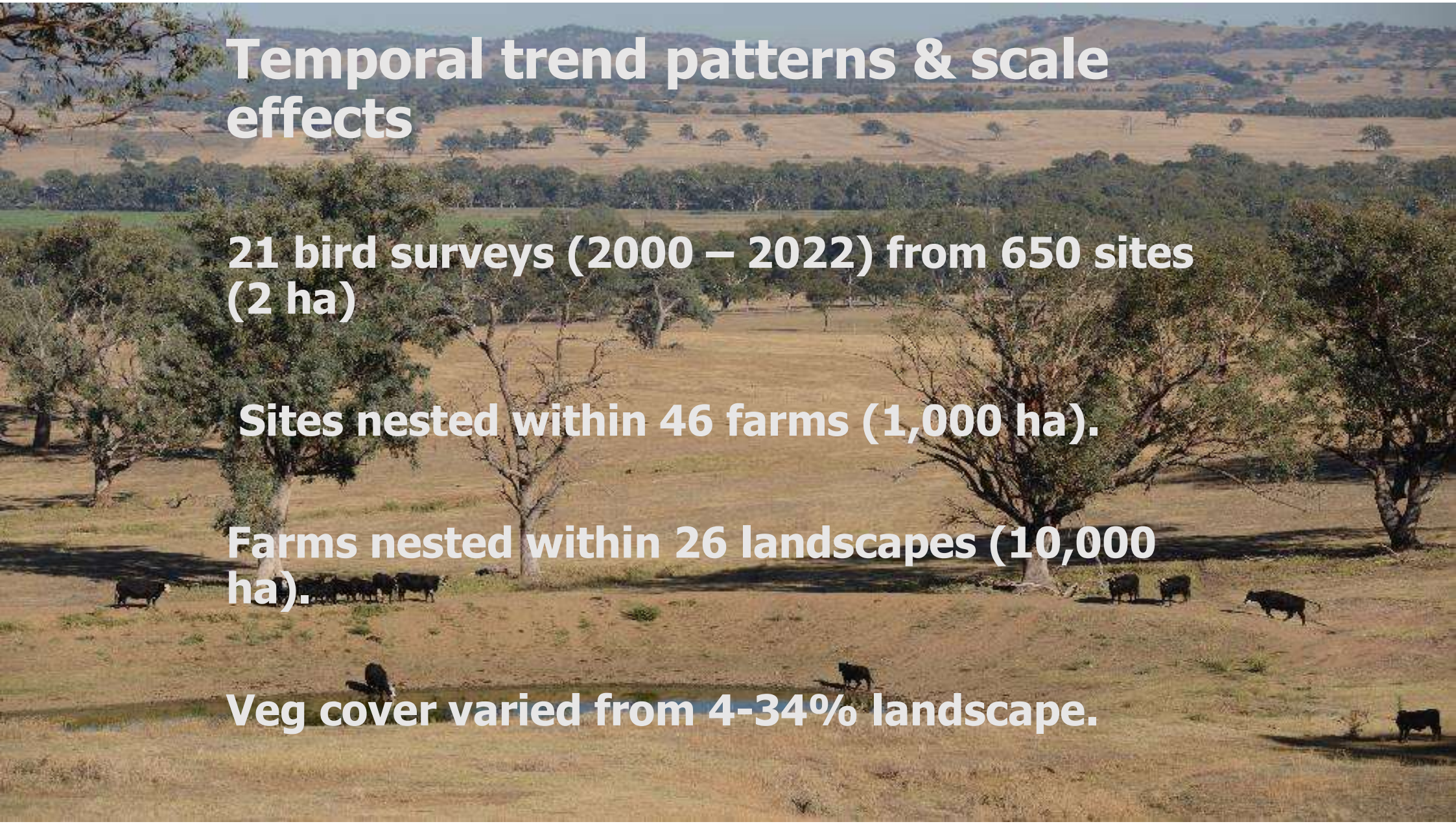
Yes – the intervention worked



SUSTAINABLE FARMS

Links between vegetation change & biodiversity change

Dave Smi



Temporal trend patterns & scale effects

21 bird surveys (2000 – 2022) from 650 sites (2 ha)

Sites nested within 46 farms (1,000 ha).

Farms nested within 26 landscapes (10,000 ha).

Veg cover varied from 4-34% landscape.

Increasing vegetation cover = increasing bird species richness

Vegetation cover has high explanatory power

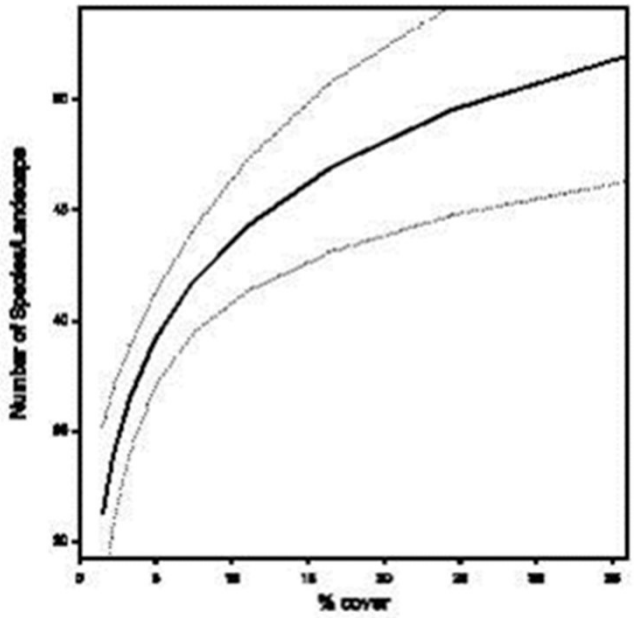
+veg cover effects (e.g. Brown Treecreeper);
-ve veg cover effects (e.g. Common Starling)

This occurs at all spatial scales

Value of working to increase veg cover at all scales

Cunningham et al. (2014a, 2014; Ecol. Apps; Diversity & Distributions)

Overall bird species richness per landscape and % native vegetation cover [an increase of 4.4 species (3.8-6.2) by doubling % vegetation cover]



Predictors

- Different scales of predictors
- Climatic/weather data (background)
- Main Predictors (user defined)
  - Region
  - Rainfall in previous 12 months
  - Woody vegetation (500m & 3km buffers)
  - Presence of Noisy Miners
  - Remnant/Planting

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Journal of Biogeography

WILEY

RESEARCH ARTICLE

Long-term monitoring in endangered woodlands shows effects of multi-scale drivers on bird occupancy

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Abstract

Aims: The effect of spatial scale on the location and abundance of species has long been a major topic of interest in ecology. Accounting for key drivers at multiple scales is critical for rigorous description of patterns of species distribution and biodiversity change. We quantified the effects of potential drivers of bird occupancy across a geographically dispersed, but heavily disturbed and fragmented ecosystem.

Location: Threatened Box-Gum Grassy Woodlands in south-eastern Australia, which stretch across 9° of latitude (~900 km).

Taxon: Birds (Class Aves).

Methods: We grouped data from four monitoring studies of birds that spanned 10–22 years in Box-Gum Grassy Woodlands. We then employed joint species distribu-

Bird Surveys

Data on environmental indicators

Statistical modelling

First version of webtool

Workshops and consultations

Expert digital designers

BirdCast

Indicating birdlife on farms

Woodland areas on your farm

Select location

Longitude

148.990220437369

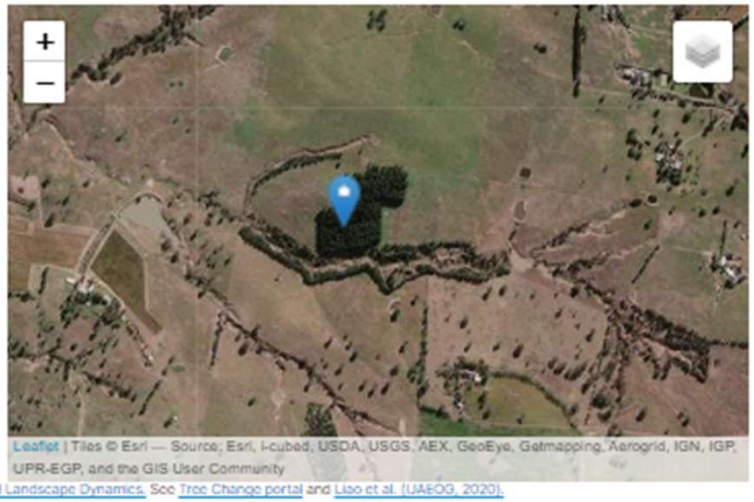
Latitude

-35.1499999714582

Representative year

2019

Load woody cover



Woody cover estimates from the ANU Centre for Water and Landscape Dynamics. See Tree Change portal and Liao et al. (IJAEOG, 2020).

Woody cover amounts

Nearby Woody Cover

Percentage area of woody cover within 500m of the centre of the woodland area (including cover inside the woodland area)

Regional Woody Cover

Percentage area of woody cover within 3km of the woodland area

Bird Diversity

Step 2: Results of Scenario 1

We've estimated occupancy for sixty species of birds the woodland on your farm based on the information you provided in step 1.

Expected number of species

The upper bars are estimates of the expected number of species that occupy at least one woodland area on your farm (Scenario 1) compared to the average woodland area in our data (Average).

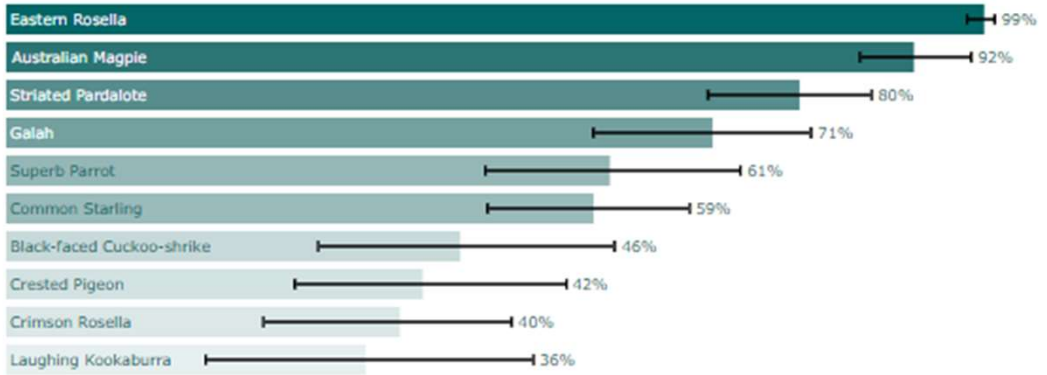
The lower two bars are estimates for Scenario 1 if all the woodland areas had a minimal (2%) or a large amount (20%) of nearby woody cover.

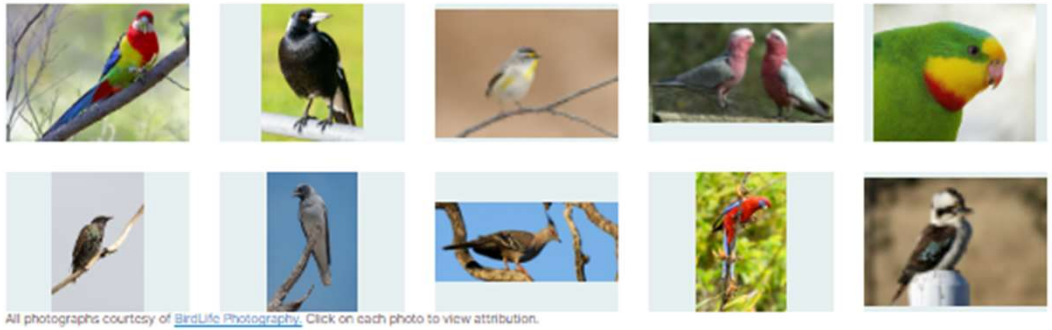
Expand all

- Most likely species
- Least likely species
- Vulnerable species
- Occupancy probability for all species

Scenario 1 | Average

Margin of error





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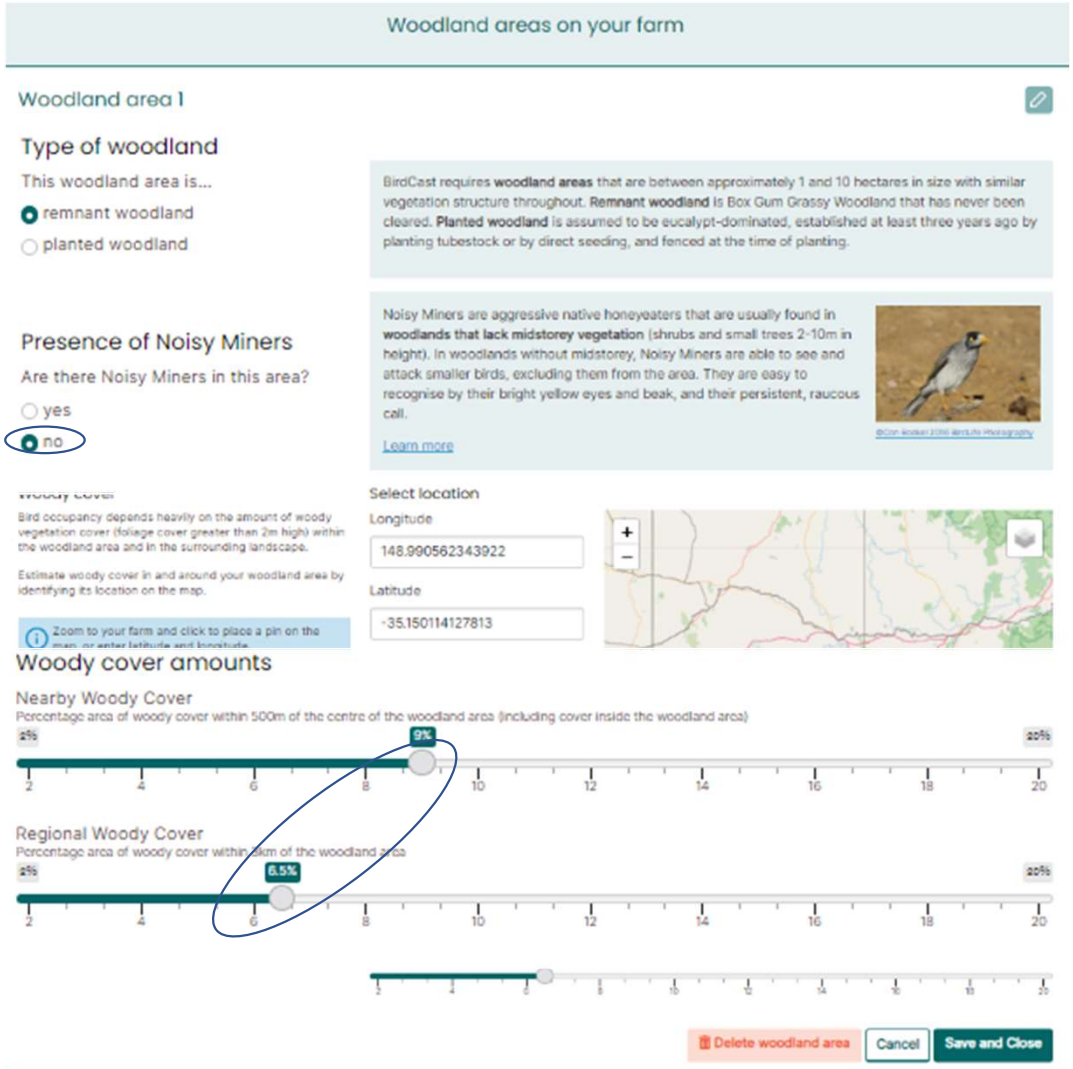
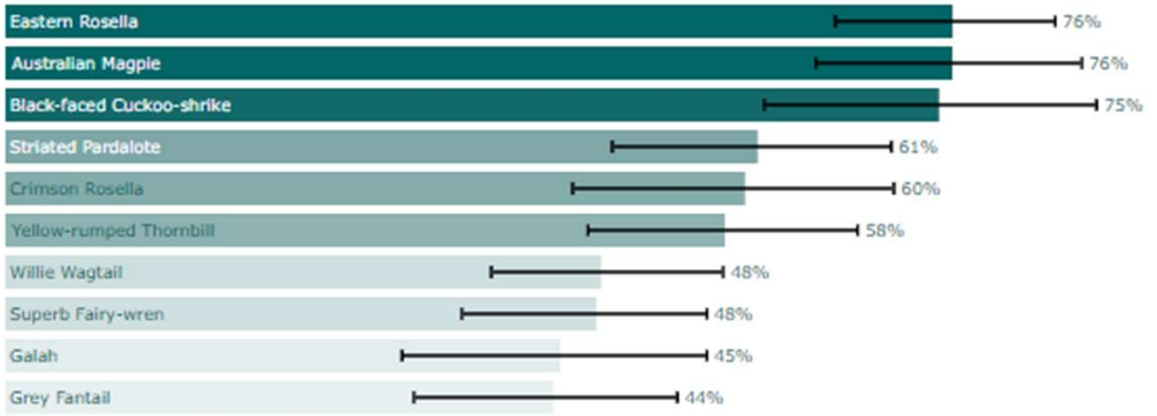

Woodland areas on your farm
Woodland area 1
Type of woodland
This woodland area is...
remnant woodland
planted woodland
BirdCast requires woodland areas that are between approximately 1 and 10 hectares in size with similar vegetation structure throughout. Remnant woodland is Box Gum Grassy Woodland that has never been cleared. Planted woodland is assumed to be eucalypt-dominated, established at least three years ago by planting tubestock or by direct seeding, and fenced at the time of planting.
Presence of Noisy Miners
Are there Noisy Miners in this area?
yes
no
Noisy Miners are aggressive native honeyeaters that are usually found in woodlands that lack midstorey vegetation (shrubs and small trees 2-10m in height). In woodlands without midstorey, Noisy Miners are able to see and attack smaller birds, excluding them from the area. They are easy to recognise by their bright yellow eyes and beak, and their persistent, raucous call.
Learn more
Bird occupancy depends heavily on the amount of woody vegetation cover (foliage cover greater than 2m high) within the woodland area and in the surrounding landscape.
Estimate woody cover in and around your woodland area by identifying its location on the map.
Zoom to your farm and click to place a pin on the
Select location
Longitude
148.990562343922
Latitude
-35.150114127813
Woody cover amounts
Nearby Woody Cover
Percentage area of woody cover within 500m of the centre of the woodland area (including cover inside the woodland area)
9%
Regional Woody Cover
Percentage area of woody cover within 5km of the woodland area
6.5%
Delete woodland area
Cancel
Save and Close

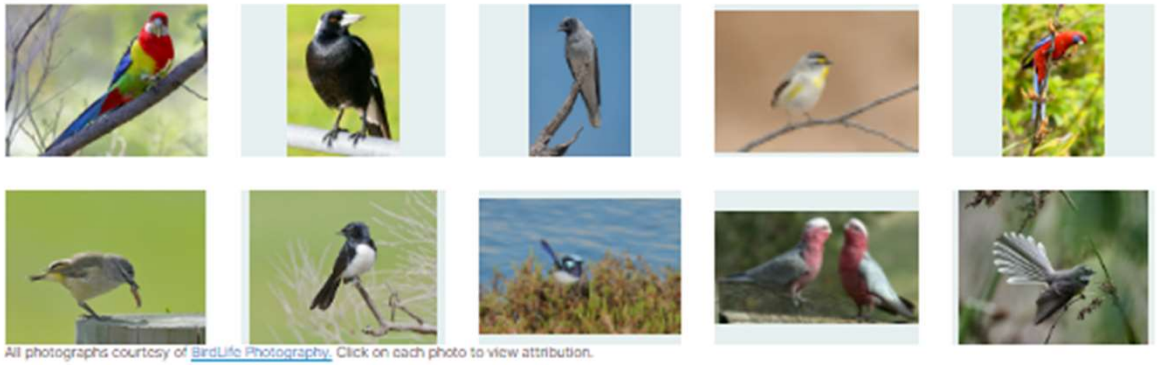
Compare Bird Diversity

Step 4: Review comparison

Scenario 2 | Scenario 1

Margin of error





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Back to top | Close

https://sustfarm.shinyapps.io/BirdCast/

Developed by Kassel Hingee and Martin Westgate

Some summary points

- Huge areas of woodland lost/degraded
- Many woodland birds declining
- But some are increasing – especially planting-associated birds
- Different vegetation types = different species
- Must have a portfolio of vegetation assets on a farm

- Plantings are valuable – species in them change over time
- Plantings are critical drought refuges
- Don’t graze plantings

Some summary points

- Incentive schemes can be successful
- Be careful with some interventions – like nest boxes
- Maintain long-term monitoring – it's the only way to generate these key insights
- More work to do……

Projects to improve natural assets on farms

Enhance farm dams

Establish shelterbelts and other plantings

Protect remnant woodlands

Protect creeks, wetlands and riparian zones

Protect paddock trees and grow new ones

Maintain native perennial grasses

Protect rocky outcrops

SUSTAINABLE FARMS


Australian National University
SUSTAINABLE FARMS
Ten ways to improve the natural assets on a farm

Natural Asset Farming

Creating Productive and Biodiverse Farms

David Lindenmayer, Suzannah Macbeth,
David Smith, Michelle Young

SUSTAINABLE
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www.sustainablefarms.org.au

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